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On the field-induced transport of magnetic nanoparticles in incompressible fluid flow

Combining Onsager's variational principle with the equations of magnetostatics, we propose a thermodynamically consistent model for the motion of magnetized nanoparticles – suspended in an incompressible liquid and under the influence of magnetic fields. It couples evolution equations for magnetization, magnetic field, and particle density to Navier-Stokes-type momentum equations. We show the existence of weak solutions using a Galerkin approximation based on eigenfunction expansions of the associated Stokes, Maxwell, and Laplace operators. In the last part, numerical simulations in 2D are presented which are based on stable finite-element discretizations. They illustrate how magnetic nanoparticles are attracted by magnetic fields and how their magnetization interacts with the applied external field.

This is joint work with P. Weiß (Erlangen).

Ort: Mathematik Ost, 40.03.003,   Zeit: **Donnerstag**, 21.02.19 um **09:00** Uhr

Zu diesem Vortrag sind Sie herzlich eingeladen.

gez. Anja Schlömerkemper